

We Claim:

1. A multi-phase pulse width modulated power supply comprising:

- 5 an input for receiving a modulating input signal;
 a plurality of phases, each phase comprising a power switching device for generating an output signal;
 a controller which is arranged to receive the modulating input signal and to generate a set of control signals, each
10 control signal controlling the operation of the switching device in a respective one of the phases, wherein each control signal comprises a sequence of time windows, there being a pulse of variable width positioned within each time window, and wherein the control signal for at least one of the phases has
15 pulses aligned with a different part of the respective time windows compared to the control signals for other phases.

2. A power supply according to claim 1 wherein the at least one control signal has its pulses substantially aligned with a
20 different end of the respective time windows compared to the control signals for other phases.

3. A power supply according to claim 1 wherein substantially half of the control signals have pulses substantially aligned
25 with a different end of their respective time windows compared to the other control signals.

4. A power supply according to claim 3 wherein alternate phases have the pulses in their respective control signals
30 substantially aligned with different ends of their respective time windows.

5. A power supply according to claim 1 wherein pairs of phases have the pulses in their respective control signals
35 substantially aligned with opposite ends of their respective time windows.

6. A power supply according to claim 5 wherein alternate phases have the pulses in their respective control signals substantially aligned with opposite ends of their respective time windows.

7. A power supply according to claim 1 wherein the modulating input signal is an envelope of a signal for processing by a power amplifier and an output of the power supply forms a power supply for the power amplifier.

8. A power amplifier comprising an amplifying device and a modulated power supply according to claim 1, wherein the amplifying device has an input for receiving an input signal for amplification, wherein an envelope level of the input signal is fed to the power supply as the modulating input signal and an output of the power supply forms a power supply for the power amplifier.

9. A wireless base station comprising a power amplifier according to claim 8.

10. A control apparatus for a multi-phase pulse width modulated power supply comprising an input for receiving a modulating input signal and a plurality of phases, each phase comprising a switching device for generating an output signal, wherein the control apparatus is arranged to receive the modulating input signal and to generate a set of control signals, each control signal controlling the operation of the switching device in a respective one of the phases, wherein each control signal comprises a sequence of time windows, there being a pulse of variable width positioned within each time window, and wherein the control signal for at least one of the phases has pulses aligned with a different part of the respective time windows compared to the control signals for other phases.

11. A control apparatus according to claim 10 wherein the at least one control signal has its pulses substantially aligned with a different end of the respective time windows compared to the control signals for other phases.

12. A control apparatus according to claim 10 wherein substantially half of the control signals have pulses substantially aligned with a different end of their respective time windows compared to the other control signals.

13. A control apparatus according to claim 12 wherein alternate phases have the pulses in their respective control signals substantially aligned with different ends of their respective time windows.

14. A control apparatus according to claim 10 wherein pairs of phases have the pulses in their respective control signals substantially aligned with different ends of their respective time windows.

15. A control apparatus according to claim 14 wherein alternate phases have the pulses in their respective control signals substantially aligned with different ends of their respective time windows.

16. A method of operating a multi-phase pulse width modulated power supply comprising an input for receiving a modulating input signal and a plurality of phases, each phase comprising a switching device for generating an output signal, the method comprising:

receiving a modulating input signal;

generating a set of control signals, each control signal controlling the operation of the switching device in a respective one of the phases, wherein each control signal comprises a sequence of time windows, there being a pulse of

variable width positioned within each time window, and wherein the control signal for at least one of the phases has pulses aligned with a different part of the respective time windows compared to the control signals for other phases.

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17. A method of generating a power supply signal using a multi-phase pulse width modulated (PWM) power supply which comprises an input for receiving a modulating input signal and a plurality of phases, each phase comprising a switching device
10 for generating a pulse width modulated output signal, the method comprising:

receiving a modulating signal;

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generating a set of control signals, each control signal for controlling the operation of the switching device in a respective one of the phases, wherein each control signal comprises a sequence of time windows, there being a pulse of variable width positioned within each time window, and wherein the control signal for at least one of the phases has pulses aligned with a different part of the respective time windows
20 compared to the control signals for other phases;

applying the control signals to the switching devices of the phases; and,

combining the outputs of the multiple phases to derive the power supply signal.

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18. A power supply signal resulting from the method of claim 17.

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19. A computer program product for implementing a method of controlling operation of a multi-phase pulse width modulated power supply comprising an input for receiving a modulating input signal and a plurality of phases, each phase comprising a switching device for generating an output signal, the computer program product comprising instructions which are arranged to
35 cause a control apparatus of the supply to:

receive a modulating input signal; and,

generate a set of control signals, each control signal controlling the operation of the switching device in a respective one of the phases, wherein each control signal comprises a sequence of time windows, there being a pulse of variable width positioned within each time window, and wherein the control signal for at least one of the phases has pulses aligned with a different part of the respective time windows compared to the control signals for other phases.

10 20. A control apparatus for a pulse width modulated power supply comprising an input for receiving a modulating input signal and a switching device for generating an output signal, wherein the control apparatus is arranged to receive the modulating input signal and to generate a control signal for
15 controlling operation of the switching device, wherein the control signal comprises a sequence of time windows, each time window having a pulse of variable width which is substantially aligned with an end of the time window.

20 21. A pulse width modulated power supply comprising a control apparatus according to claim 18.

22. A method of operating a power supply comprising an input for receiving a modulating input signal and a switching device
25 for generating an output signal, comprising:

receiving the modulating input signal;

generating a control signal for controlling operation of the switching device, wherein the control signal comprises a sequence of time windows, each time window having a pulse of
30 variable width which is substantially aligned with an end of the time window.

23. A multi-phase pulse width modulated power supply comprising:

35 an input responsive to a modulating input signal;

a plurality of phases, each phase comprising a power switching device;

5 a controller which is responsive to the modulating input signal and generates a set of control signals, each control signal controlling the operation of the switching device in a respective one of the phases, wherein each control signal comprises a sequence of time windows, there being a pulse of variable width positioned within each time window, and wherein the control signal for at least one of the phases has pulses
10 aligned with a different part of the respective time windows compared to the control signals for other phases.